

A Data-Driven approach to Stock Market Investment

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Abstract: As the financial industry rapidly moves toward data-driven optimization, with the recent emergence of modern finance sophisticated and systematic investment management practices are observed by utilizing the provided financial instruments and tools to make practical investment decisions. Big data technologies can help in leveraging real-time data in cloud computing environments. The ability of big data to acquire, process, and analyse real-time data quickly and accurately cannot be matched by any other technology. When faced with a plethora of market information, big data technology provides a diversified source of information for multiple investment strategies. Instead of just simply analysing stock prices, it also takes into account political and social trends that may or are affecting the stock market. This review introduces the current data trends along with the extensive influence of big data. Moreover, it outlines the newly explored research directions.

Keywords: Finance, Big Data, Stocks, Investment

1. Introduction

The financial domain presents as one of the most complex fields as it can be easily influenced by numerous factors which makes it susceptible to unexpected changes. Data-driven investing is defined as a broader term for investment methods that involve analysing traditional and alternative data sources to provide investors with specific investment insights. As more and more data gets created every day, investors can leverage it for trend analysis, patterns, and risks. Stocks are volatile and unpredictable because of the continuous flow of news, announcements, international data points, etc. The variation in investment methodology tends to create volatility in the market. Stock prices are driven by a variety of factors, but ultimately the price at any given moment is due to the supply and demand at that point in time in the market. At the same time, the forms of investments have undergone essential changes. Traditional model-driven investment methods are inevitably confronted with challenges. With the popularization of computer and network technology, most data related to financial investment activities becomes traceable and is rapidly accumulated into a substantial volume. With the introduction of Machine Learning and its strong algorithms, the most recent market research and Stock Market Prediction advancements have begun to include such approaches in analysing stock market data. More and more data-driven investment methods are emerging and demonstrate vigorous vitality. As shown in **Fig. 1**, the cumulative returns of data-driven strategies are approximately 172.2% which has a promising outlook for the coming years. In recent years, we have witnessed a couple of interesting research directions on data-driven investment strategies for stock price prediction using innovative artificial intelligence models. Herein we review the recent advances in the financial market alongside the newly explored research directions on data-driven investment strategies. Lastly, we outline the limitations presented by this front along with some advantages.

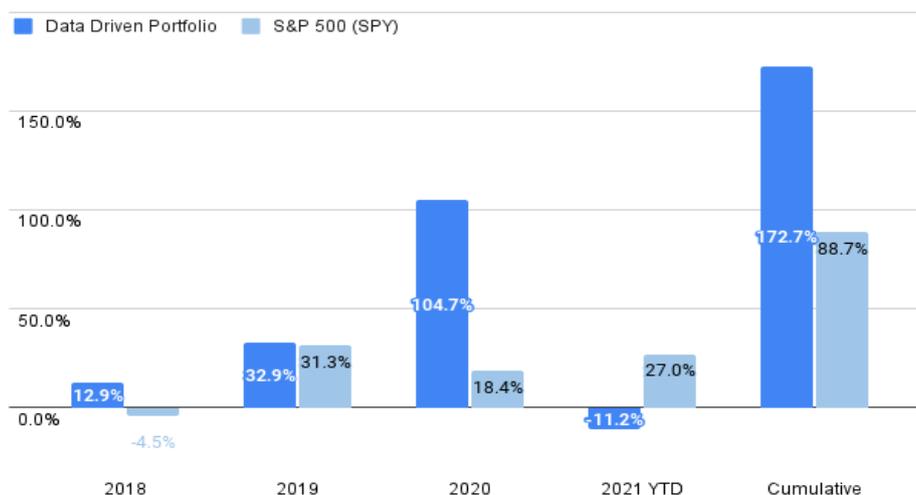


Fig. 1. Returns for the Data Driven Portfolio as of the end of 2021.

2. Advantages of data-driven investing

2.1 Broad coverage

As all of society is becoming more automated, as big data is embraced, left and right, as we all become a little bit overrun by all the data that's thrown at us, it makes sense to shift to quantitative-type investors. And yet they are hard to figure out. A broad-based

index is a benchmark used to track the performance of a large group of stocks picked to represent the broader stock market. Data-driven investing involves other data processing techniques, such as web scraping, data parsing, and data normalization. Database normalization is the process of structuring a database according to what's called normal forms, with the final product being a relational database, free from data redundancy. These processes are often automated and require additional software rather than just purchasing raw data sets. Data analysts and researchers from other departments are able to tackle large quantities of data due to the processing power of new software and AI technology.

2.2 predictive analytics

Predictive analytics is essentially the practice of utilizing real-time or current data to help AI models predict risk and return rates. This is different from earlier forms of model-driven investing, in that older model-driven investing relied on historical data and had limited customizability that led to restricted insights, often missed hidden market gaps, and could not account for short-term risk and market trends. By far, new advancements in alternative data have had the most significant impact on predictive analytics. Predictive analytics models may be able to identify correlations between sensor readings. Predictive Analytics is basically the use of mathematical and statistical methods, including artificial intelligence and machine learning, to predict the value or status of something of interest.

2.3 Decision objectivity

Due to the major stakes involved in investing, absolute objectivity is difficult to come by. Data-driven investing helps remedy any conscious or subconscious biases investors and analysts may have toward a particular investment. This removes any chance for poor or irrational investment practices and decisionmaking. One prominent example is the success companies have reported when implementing AI or utilizing data managing processes such as web data integration.

3. Data-driven investment strategies

3.1 Risk Parity

Risk parity investing is a technique utilized in investment management, in which investors focus on distributing risks associated with assets. Risk parity seeks equity-like returns for portfolios with reduced risk. Recently, due to the advancements in the alternative data industry, investors can make data-driven decisions surrounding risk factors based on proven algorithms such as the Sharpe ratio. For example, insights and data surrounding employee satisfaction may indicate if a company might be declining internally, and therefore becomes an investment risk factor. For investors who could access leverage efficiently, Risk Parity historically has been a compelling strategy, because bonds have exhibited better risk-adjusted returns than stocks for decades.

3.2 Managed futures

Managed futures refers to investing practiced by trend-following financial professionals such as commodity trading advisors and hedge funds. This investment strategy is highly systematic and relies on major market trends, or "commodities." Additionally, because this strategy relies on tracking market trends, managed futures are considered alternative investments and consequently diversify portfolios while also managing risk.

3.3 AI Investing

AI investing, also known as big data investing, is a relatively new strategy of investing that relies on making investment decisions based on a measure called alpha. Alpha refers to the measure of active return on investment, indicating a successful investment cycle. In addition to enhancing alpha, companies are also utilizing other AI techniques to track social sentiment, business operations, as well as security management. Algorithmic trading, the most widely used form of AI in the financial industry, uses complex and advanced mathematical models to make transaction decisions on behalf of humans. This strategy uses big data to make automated investment decisions to enhance alpha, which is a measurement of your active return on investment. Essentially, artificial intelligence is defined as algorithms and programs specially designed to be similar to human intelligence. Rules built into this model attempt to determine the optimal time to trade, with the least repercussions on stock prices.

3.4 Event-driven investing

Event-driven investing, also known as event-driven arbitrage, is a strategy that typically utilizes new and current alternative data sources and leverages insights that surround current major financial events. Hedge funds and private equity firms often employ this strategy when there are mergers, earning releases, acquisitions, bankruptcy, and even major world events such as natural disasters. This method is helpful for investors looking to balance a portfolio with short-term securities. The event-driven strategy is oriented around investments that seek to exploit and profit from corporate events that can create pricing inefficiencies.

3.5 Using new data

Computers have always been able to analyse data, but this data had to preferably be structured or quantifiable. The rise of data-driven investing creates the opportunity to use unstructured information, including language, speech, images, and others. All of those mentioned are used for business valuations; for instance, new data types allow you to identify positive trends on the market and incorporate them into business valuation or value creation abilities.

4. Big data

Big data in finance refers to large, diverse, and complex sets of data that can be used to provide solutions to long-standing business challenges for financial services and banking companies around the world. Big data is completely revolutionizing how the stock

markets worldwide are functioning and how investors are making their investment decisions. Machine learning – the practice of using computer algorithms to find patterns in massive amounts of data – is enabling computers to make accurate predictions in evolving stock market trends. Today, customers are at the heart of the business around which data insights, operations, technology, and systems revolve. Thus, big data initiatives underway by banking and financial markets companies focus on customer analytics to provide better service to customers.

5. Conclusion

Big The rapid advance of cutting-edge artificial intelligence technology provides potentially promising solutions to datadriven investment strategies. It is visible that data-intensive AI models are increasingly employed in various domains and make essential improvements. More and more data-driven investment methods are emerging rapidly and new research methods are being explored. The integration of alternative data with AI investing technologies has demonstrated that when investors utilize traditional financial data with alternative data, the opportunities are limitless.

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